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AUTHOR Padgett, Susan S.
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ABSTRACT

The evaluation of the traffic safety curriculum as presented to K-9 students in North Carolina focused on three areas: (1) the extent to which students acquired the information included in the curriculum, (2) the extent to which students showed a change in their actual pedestrian and bicyclist behavior, and (3) the extent to which teachers made use of the curriculum materials. The extent of knowledge was measured through a comparative test of experimental and control groups of Grades 3, 6, and 9 students. A filming system was developed to record actual pedestrian and bicyclist behavior of students from experimental and control schools. Finally, questionnaires were developed to determine the attitude of teachers towards the curriculum materials. The findings of the study revealed the following: (1) Grades 3 and 6 students exposed to the curriculum showed significant increases in knowledge compared to students in control schools, but no significant differences were found at the Grade 9 level, (2) the behavior observed did not show the type of effects expected, and (3) the results of the questionnaire (90.5% return) indicate that traffic safety curriculum was generally accepted and used by teachers. (Author/EC)

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THE EVALUATION OF THE NORTH CAROLINA K-9 TRAFFIC SAFETY CURRICULUM: METHODOLOGY, FINDINGS, AND RECOMMENDATIONS

Susan S. Padgett

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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The Evaluation of the North Carolina K-9 Traffic Safety Curriculum: Methodology, Findings, and Recommendations

Susan S. Padgett

University of North Carolina
Highway Safety Research Center

Under the direction of Research Triangle Institute, traffic safety curriculum was developed for use in kindergarten through ninth grades. Through workshops, teachers were involved in the curriculum development from the beginning. This curriculum was pilot tested in fourteen public schools in the eastern and western areas of North Carolina, and was taught by both workshop and nonworkshop participants. The purpose of the evaluative research described below was to determine the effectiveness of the curriculum to provide input for the revision of curriculum materials.

METHODOLOGY

The evaluation of the kindergarten through ninth grade traffic safety curriculum was conducted in three parts. The first concerned the extent to which the students acquired the information included in the curriculum; that is, how much did they learn. The second concerned the extent to which the students showed a change in their actual pedestrian and bicyclist behavior. The third part of the evaluation concerned the extent to which teachers actually made use of the curriculum materials and what changes they would recommend.

To determine the extent of knowledge increase, tests were developed for the third, sixth, and ninth grade levels based on the curriculum content. Forty items were developed at each designated grade level. The schools in which the curriculum was being taught were designated experimental schools. Control schools were selected from within the same school systems and on the basis of input from the local teachers and administrators as to which schools could be considered comparable. Within each grade level, four schools were used, two designated as experimental and two as control. To insure better geographic coverage of the state, for each grade level, experimental and control schools were equally distributed between the eastern and the western areas. Three classes were tested within each school, resulting in a total of twelve classes tested for each grade level. Twenty test items at each grade level were randomly chosen for pretests which were administered at both experimental and control schools early in the semester. After the curriculum had been taught in the experimental

schools, post-tests including all forty items at each grade level were administered to the same students previously tested.

The analysis of these data was designed to answer a basic question: How much knowledge did the student acquire as a result of the program? A statistical test (2-tailed t test for paired data) was chosen to indicate whether the change in amount of knowledge was great enough to be significant.

Table 1 illustrates the evaluation design used.

Table 1. Design for knowledge testing.

	Experimental Schools	Control Schools
Before curriculum	Pre-test	Pre-test
Treatment	Exposure to curriculum	No exposure to curriculum
After curriculum	Post-test	Post-test

In the second part of the evaluation, a filming system was developed and utilized for recording the pedestrian and bicyclist behavior in the school area, again before and after the curriculum was used. Observations were filmed at two elementary schools, one control and one experimental school in the same school district. Schools were selected to be filmed on the basis of their covering the same grade levels, and having children walking and riding bicycles home from school. Again input from the local teachers and administrators was used in the selection of these schools.

A super 8 movie camera on a tripod was used. It was placed at an obscure, elevated location near the schools' crosswalks. The camera was turned on and off with a ten-foot cable release.. Thus, the children were unaware that they were being filmed. The total filming time was approximately four minutes; however, this represents about 15 minutes of behavior since the camera was operated only when the children were actually crossing the street.

It could be argued that the crosswalk outside the school may not be the most appropriate place to be filming observations, since students are more likely to be involved in traffic crashes several blocks away from the school rather than right next to it. However, filmed observations at locations more remote from the school ground would yield relatively few observations at a corresponding increase in cost. Furthermore, if a traffic safety curriculum is to have any impact it might be expected that the greatest effects would be apparent closest to the school. Consequently in order to maximize the possibility of observing an effect of the traffic safety curriculum, the decision was made to film students at the crosswalks next to the schools.

Films were made in September and again in February. It was anticipated that there might be seasonal variations in students' behavior at the crosswalks, that is, in the springtime the students might be more active than earlier in the year. A control school was included in the design to take into account any such seasonal effects. In addition, at both schools both before and after the curriculum was taught, the films were made in bright clear weather.

A coding sheet was developed for recording observations of the filmed pedestrian and bicyclist behavior. The sheet provided space for tallies of the following:

(1) students walking across the street
(2) students running across the street
(3) students walking bikes across street
(4) students riding bikes across street
(5) students remaining on curb until patrol indicated right-of-way
(6) students failing to remain on curb until patrol indicated right-of-way
(7) students crossing within the marked crosswalks
(8) students crossing outside the marked crosswalks

The behaviors numbered 1, 3, 5, and 7 were drawn directly from the curriculum materials and were among those behaviors the curriculum was attempting to foster.

If a student engaged in unsafe behavior at any point while crossing the intersection (see numbers 2, 4, 6, and 8), only his unsafe behavior was recorded. For example, if in crossing, a student walked three quarters of the way, and ran the last quarter, he was counted as running.

To increase the reliability of the observations made, a panel of three judges was selected to view the films. The judges were not told which school was experimental and which was control. First, the films were viewed and the observations recorded by each judge independently. A measure of the inter-judge reliability (the ratio of within variation to total variation) indicated high agreement.

After the judges had independently recorded their observations, they compared their separate sets of observation data. The films were then viewed again, observations discussed, and discrepancies resolved.

Table 2 illustrates the design used.

Table 2. Design for behavioral observations.

	Experimental School	Control School
Before curriculum	Bicyclist & pedestrian behavior filmed	Bicyclist & pedestrian behavior filmed
Treatment	Exposure to curriculum	No exposure to curriculum
After curriculum	Bicyclist & pedestrian behavior filmed	Bicyclist & pedestrian behavior filmed

For the third part of the evaluative study, questionnaires were developed for grade levels K-3, 4-6, 7, 8, and 9 to determine: (1) how useful the materials were; (2) how much they were actually used; (3) which parts were not used and why; and (4) what changes the teachers would recommend.

The fourteen experimental school principals provided a listing of all the teachers in their schools involved in the K-9 traffic safety program. Each of these teachers was mailed a questionnaire. All questionnaire responses were recorded.

FINDINGS

Knowledge Acquired

The students exposed to the curriculum at the third and sixth grade levels showed significant increases in knowledge compared to students in control schools. However, no significant differences were found between the two groups on the ninth grade level.

There are a number of possible contributing factors which may account for the failure to observe an increase in knowledge at the ninth grade level. These included, first, the higher attrition rate between pre-tests and post-tests at the ninth grade level. The analysis used included only those students for whom both a pre-test and a post-test were obtained. At grade 3 there was a 22 percent loss of students between pre-testing and post-testing compared with a 14 percent loss at grade 6 and a 44 percent loss at grade 9. Second, there were relatively fewer traffic safety teachers for the ninth grade, thus necessitating larger classes and possibly making it more difficult to communicate the information. Third, the ninth grade students may have had more difficulty recalling information because the curriculum was presented for only three weeks in the ninth grade, while for the elementary grades it was spread over several months. From the data, there is no way of knowing how long the interval was between the completion of the ninth grade mini-course and the post-testing of the students. Since retention is likely to vary with the length of time since the

curriculum was completed, this factor could have affected the findings. Fourth, information obtained from the teacher questionnaire indicated that the ninth grade teachers were less satisfied with the curriculum materials. Fifth, there appeared to be more confusion concerning the administration of the 7-9 traffic safety program in comparison to the other levels. To illustrate, an eighth grade teacher reported that the ninth grade teachers in her school requested that the traffic environment materials (designed for grade eight) not be taught in the eighth grade. A ninth grade teacher reported teaching the unit "along with the driver education work," when the unit was designed as a pre-driver education mini-course. This same teacher reported teaching traffic safety from her workshop notes before receiving the curriculum and before the pre-tests. She was apparently instructed to follow this procedure. After she had received the curriculum, however, she taught the material from that. However, when the findings were examined for grade 9, with the test scores from this school omitted, there was still no indication of an increase in knowledge. In addition, one eighth grade teacher in an experimental school reported on the questionnaire that she was unaware of the existence of the traffic safety curriculum even though she was teaching in an experimental school. These problems could, to varying degrees, be alleviated in the expanded use of the traffic safety curriculum. Hopefully such efforts would lead to a greater impact of the curriculum at the ninth grade level.

Behavior Observed

The limited observations which we did obtain of students leaving school did not show the type of effects that would be hoped for.

For both experimental and control schools, a greater proportion of the children were running, and a smaller proportion of the children were crossing outside the marked crosswalks in the post-curriculum films as compared to the pre-curriculum films. In addition, a large proportion, 89 percent or greater, remained on the curb until the patrol indicated the right-of-way in all the films--experimental and control schools, before and after the curriculum. No comparisons can be made relevant to the bicycle behavior, however, because of the very small frequency of bicyclists in the experimental films.

These results must be interpreted with caution, however, because the number of observations were not sufficient to draw firm conclusions. There were only 14 pilot schools from which to sample, and eight of those schools were in the mountains of North Carolina where students are bused. Of the six remaining schools, all in the east, only two were strictly elementary (grades 1-6). Therefore, the behavioral facet of the evaluation is presented primarily for its methodological interest.

Teacher Responses

The questionnaire was mailed to all the teachers using the curriculum. Of the teachers contacted, 90.5 percent completed and returned the questionnaire.

For the most part, the workshop and nonworkshop teachers on all grade levels rated the curriculum "good," used it "considerably" or "somewhat," found using the materials to be "reasonable," and considered the suggested activities "most helpful" and the curriculum films "least helpful." In general, both workshop and nonworkshop teachers used the curriculum "both" as a separate unit and integrated into the existing curriculum, on grade levels K-6; and "solely" as a separate unit at grade levels 7-9.

Of importance, overall a larger proportion of the workshop participants used the materials than the nonworkshop teachers. The materials that were reported unused by the majority of both groups of teachers, workshop and nonworkshop, focused on the areas of farm machinery and minicycle safety for grades 4-6, tractor safety for grade seven, and auto trip planning for grade 8. The major reason given for non use was inadequate time. Other reasons included lack of relevance for the particular students involved.

Seventy-seven percent of the teachers returning the questionnaire provided recommendations for changes as well as comments about the curriculum. These comments alone were indicative of a high interest and concern among the teachers. Among the recommendations from the teachers, those most frequently expressed included the desire for additional and more readily available audio-visual materials; ready-made masters for reproduction with larger and less crowded type; simpler student activities in general.

In summary, the results indicate that a traffic safety curriculum was developed that was generally accepted and used by the teachers. Furthermore, at the elementary level it was associated with significant increases in traffic safety knowledge on the part of the students. However, the limited measures that were made of the actual student pedestrian and bicyclist behavior failed to show an effect of the curriculum. Because of the limited behavioral observations that were obtained, it would be premature to arrive at any firm conclusions concerning the impact of the curriculum on behavior. The size of the sample observed was such that only a fairly marked change in behavior would have been detected. Therefore the behavioral observations should be considered primarily in terms of whatever interest they may have from a methodological standpoint.

The traffic safety curriculum was conducted as a pilot project initially because it was generally agreed that we did not know at this time the best possible way to teach such a curriculum. The evaluation of this pilot effort was conducted with the purpose of providing information on which to base recommendations and changes in the curriculum. While recognizing that no evaluation is conclusive, the following recommendations were offered for consideration in the expansion and revision of the traffic safety curriculum.

1. Curriculum revisions should include greater focus on behavioral practice of the traffic safety principles being taught. This recommendation is more easily made than implemented. To provide behavioral practice in traffic safety principles may require facilities other than the

traditional classroom. At the elementary level the physical education period could offer one opportunity.

2. Because the curriculum is just one approach to traffic safety and like any other approach has its limitations, it was also recommended that exploration be made of possibilities involving individuals other than classroom teachers in instruction in safe traffic behavior. Perhaps the school patrol could be provided with training that would enable them to reinforce the instruction being given in the traffic safety curriculum. Likewise, school bus drivers could perhaps become involved as liason personnel in providing additional real world instruction in safe passenger and pedestrian behavior. Other community members possibly could be involved as aides to teachers in providing students with on-the-scene instruction in traffic safety.

3. Because the implementation of the curriculum was relatively smooth at the elementary school level, because the results looked most promising at this level, and because there appear to be considerable problems in the administration of the curriculum at the junior high level, serious consideration should be given to focusing available resources on the elementary school level and omitting the junior high program. The statistics concerning the age of pedestrian injuries and deaths would support such a focus.